

What is claimed is:

1. A transmitting circuit comprising  
a clock signal transmitting circuit for  
transmitting a clock signal through a first signal line;  
5 a synchronization data generating circuit for  
generating synchronization data which represents a  
delimiter of serial data being transmitted of a  
predetermined unit length, and whose value changes two or  
more times in a predetermined time interval associated  
10 with the clock signal; and  
a data transmitting circuit for superposing the  
generated synchronization data on each serial data of the  
unit length and for synchronizing the serial data with  
the clock signal and transmitting the serial data through  
15 a second signal line.
2. A transmitting circuit as set forth in claim 1,  
wherein, as said synchronization data, said  
synchronization data generating circuit generates a set  
of data including inverted data of the last data of said  
20 unit-length serial data, and the last data after the  
inverted data.
3. A transmitting circuit as set forth in claim 1,  
wherein, as said synchronization data, said  
synchronization data generating circuit generates  
25 data whose value changes two or more times in one cycle

of said clock signal.

4. A transmitting circuit as set forth in claim 3,  
wherein, when serial data synchronized with a clock  
signal is transmitted by said data transmitting circuit,  
5 as said synchronization data, said synchronization data  
generating circuit generates data whose value changes two  
or more times in one cycle of the clock signal.

5. A transmitting circuit as set forth in claim 3,  
wherein

10 when said synchronization data is superposed  
and transmitted by said data transmitting circuit, the  
cycle length of said clock signal is extended, and  
thereby said synchronization data generating circuit  
generates synchronization data whose value changes two or  
15 more times in the extended cycle of the clock signal; and  
said clock signal transmitting circuit  
generates said clock signal of an extended cycle length  
when said synchronization data is superposed and  
transmitted.

20 6. A transmitting circuit as set forth in claim 1,  
wherein, as said synchronization data, said  
synchronization data generating circuit generates  
data whose value changes two or more times within a  
period in which the level of the clock signal is  
25 constant, that is, from a rising edge to a next falling

edge, or from a falling edge to a next rising edge of  
said clock signal.

7. A transmitting circuit as set forth in claim 6,  
wherein, when serial data synchronized with a clock  
5 signal is transmitted by said data transmitting circuit,  
as said synchronization data, said synchronization data  
generating circuit generates data whose value changes two  
or more times within said period in which the level of  
the clock signal is constant.

10 8. A transmitting circuit as set forth in claim 6,  
wherein

when said synchronization data is superposed  
and transmitted by said data transmitting circuit, the  
length of a constant level of said clock signal is  
15 extended, and thereby said synchronization data  
generating circuit generates synchronization data whose  
value changes two or more times in the extended period of  
a constant level of the clock signal; and

20 said clock signal transmitting circuit  
generates said clock signal of an extended length of a  
constant level when said synchronization data is  
superposed and transmitted.

25 9. A transmitting circuit as set forth in claim 1,  
further comprising a parallel-serial converting circuit  
for converting parallel data being transmitted to serial

data, wherein

    said synchronization data generating circuit  
generates synchronization data representing a delimiter  
of the converted serial data of a predetermined unit

5   length;

    said data transmitting circuit transmits the  
converted serial data.

10.   A method of transmission comprising steps of:

    transmitting a clock signal through a first

10   signal line;

    generating synchronization data which  
represents a delimiter of serial data being transmitted  
of a predetermined unit length, and whose value changes  
two or more times in a predetermined time interval

15   associated with the clock signal; and

    superposing the generated synchronization data  
on each unit-length serial data, synchronizing the serial  
data with the clock signal and transmitting the serial  
data through a second signal line.

20.   A receiving circuit comprising

    a clock signal receiving circuit for receiving  
a clock signal transmitted through a first signal line;

    a serial data receiving circuit for receiving  
serial data synchronized with the clock signal and

25   transmitted through a second signal line;

5 a synchronization data detection circuit for  
detecting data from the received serial data and using  
the same as synchronization data, said data changing its  
value two or more times within a predetermined period  
associated with the received clock signal; and

a data processing circuit for detecting the  
predetermined unit length of the received serial data by  
using the detected synchronization data as a delimiter.

10 12. A receiving circuit as set forth in claim 11,  
wherein said data processing circuit converts said  
received serial data of said detected predetermined unit  
length to parallel data.

15 13. A receiving circuit as set forth in claim 11,  
wherein

when said synchronization data detection  
circuit detected a set of data including the first  
received serial data, inverted data of the first received  
serial data after that, and again the first received  
serial data after the inverted data, the inverted data  
20 and further the first data thereafter is used as said  
synchronization data; and

25 said data processing circuit detects data of a  
predetermined unit length with the first data as the last  
data of the received serial data of the predetermined  
unit length.

14. A receiving circuit as set forth in claim 11,  
wherein, as said synchronization data, said  
synchronization data detection circuit detects  
data whose value changes two or more times in a cycle of  
5 said clock signal.

15. A receiving circuit as set forth in claim 11,  
wherein, as said synchronization data, said  
synchronization data detection circuit detects  
data whose value changes two or more times within a  
10 period in which the level of said clock signal is  
constant, that is, from a rising edge to a next falling  
edge, or from a falling edge to a next rising edge of the  
clock signal.

16. A method of reception comprising the steps of:  
15 receiving a clock signal transmitted through a  
first signal line;  
receiving serial data synchronized with the  
clock signal and transmitted through a second signal  
line;  
20 detecting data from the received serial data as  
synchronization data, said data changing its value two or  
more times within a predetermined period associated with  
the received clock signal; and  
detecting the predetermined unit length of the  
25 received serial data by using the detected

synchronization data as a delimiter.

17. A data communication apparatus comprising
  - a transmitting circuit including
    - a clock signal transmitting circuit for
  - 5 transmitting a clock signal through a first signal line;
  - a synchronization data generating circuit for generating synchronization data which represents a delimiter of serial data being transmitted of a predetermined unit length, and whose value changes two or
  - 10 more times in a predetermined time interval associated with the clock signal; and
    - a data transmitting circuit for superposing the generated synchronization data on each serial data of the unit length and for synchronizing the
  - 15 serial data with the clock signal and transmitting the serial data, and
    - a receiving circuit including
      - a clock signal receiving circuit for
    - receiving a clock signal transmitted through a first
    - 20 signal line;
    - a serial data receiving circuit for receiving serial data synchronized with the clock signal and transmitted through a second signal line;
    - a synchronization data detection circuit
  - 25 for detecting data from the received serial data as

synchronization data, said data changing its value two or more times within a predetermined period associated with the received clock signal; and

5 a data processing circuit for detecting the predetermined unit length of the received serial data as a delimiter of the detected synchronization data.

18. A data communication apparatus as set forth in claim 17, wherein

as said synchronization data, said  
10 synchronization data generating circuit of said transmitting circuit generates a set of data including inverted data of the last data of said unit-length serial data, and the last data after the inverted data, and when said synchronization data detection  
15 circuit of said receiving circuit detected a set of data including the first received serial data, the inverted data of the first received serial data thereafter, and again the first received serial data after the inverted data, the inverted data and the first data thereafter is  
20 recognized as said synchronization data; and

said data processing circuit detects data of a predetermined unit length with the first data as the last data of the received serial data of the predetermined unit length.

25 19. A data communication apparatus as set forth in

claim 17, wherein

as said synchronization data, said  
synchronization data generating circuit of said  
transmitting circuit generates data whose value changes  
5 two or more times in one cycle of said clock signal.

as the synchronization data, said  
synchronization data detection circuit of said receiving  
circuit detects data whose value changes two or more  
times in one cycle of the clock signal.

10 20. A data communication apparatus as set forth in  
claim 19, wherein, when synchronized serial data is  
transmitted by said data transmitting circuit, as said  
synchronization data, said synchronization data  
generating circuit of said transmitting circuit generates  
15 data whose value changes two or more times in one cycle  
of a clock signal.

21. A data communication apparatus as set forth in  
claim 19, wherein,

when said synchronization data is superposed  
20 and transmitted by said data transmitting circuit, the  
cycle length of said clock signal is extended, and  
thereby said synchronization data generating circuit of  
said transmitting circuit generates synchronization data  
whose value changes two or more times in the extended  
25 cycle of the clock signal; and

said clock signal transmitting circuit of the transmitting circuit generates the clock signal of an extended cycle length when said synchronization data is superposed and transmitted.

5           22. A data communication apparatus as set forth in  
claim 17, wherein,

as said synchronization data, said synchronization data generating circuit of said transmitting circuit generates data whose value changes two or more times within a period in which the level of said clock signal is constant, that is, from a rising edge to a next falling edge, or from a falling edge to a next rising edge of the clock signal;

as said synchronization data, said  
15 synchronization data detection circuit of said receiving  
circuit detects data whose value changes two or more  
times within a period in which the level of said clock  
signal is constant, that is, from a rising edge to a next  
falling edge, or from a falling edge to a next rising  
20 edge of the clock signal.

23. A data communication apparatus as set forth in  
claim 22, wherein when synchronized serial data is  
transmitted by said data transmitting circuit, as said  
synchronization data, said synchronization data  
generating circuit of said transmitting circuit generates

data whose value changes two or more times within said period in which the level of a clock signal is constant.

24. A data communication apparatus as set forth in claim 22, wherein

5           when said synchronization data is superposed and transmitted by said data transmitting circuit, the length of a constant level of said clock signal is extended, and thereby said synchronization data generating circuit of the transmitting circuit generates  
10   synchronization data whose value changes two or more times in the extended cycle of the clock signal; and  
                  said clock signal transmitting circuit of the transmitting circuit generates the clock signal of an extended length of a constant level when said  
15   synchronization data is superposed and transmitted.

25. A data communication apparatus as set forth in claim 17,

                  said transmitting circuit further comprising a parallel-serial converting circuit for converting

20   parallel data being transmitted to serial data,  
                  wherein  
                          said synchronization data generating circuit of the transmitting circuit generates synchronization data representing a delimiter of the converted serial data of  
25   a predetermined unit length;

said data transmitting circuit of the  
transmitting circuit transmits the converted serial data,  
      said data processing circuit of said receiving  
circuit converts said received serial data of said  
5      detected predetermined unit length to parallel data.